

**WHAT IS CLAIMED IS:**

1. An apparatus for detecting a transmission mode in a digital audio receiver, comprising:

a null symbol length calculation unit for calculating the null symbol length of each sample by detecting the starting and end points of the null

5 symbol of each sample; and

a mode determination unit for determining a transmission mode by comparing the null symbol length calculated by the null symbol length calculation unit with a predetermined range of the null symbol length for each mode.

2. The apparatus of claim 1, further comprising:

a square value calculation unit for calculating the square of the value of each sample of a received signal to detect the starting and end points of the null symbol of each sample.

3. The apparatus of claim 2, wherein the null symbol length calculation unit comprises:

a window buffer portion for storing the square values of the samples received for first or second search period in two window buffers having the

5 same size;

a mean square calculator for calculating the mean square of the samples stored in the two window buffers;

a null symbol location detector for determining the starting point of a null symbol by detecting a minimum mean square value output from the mean square calculator for the first search period, outputting a search period control signal for changing the first search period to the second search period, and determining the end point of the null symbol by detecting a maximum mean square value from the mean square calculator for the second search period; and

15 a step controller for changing the search periods for the window buffer portion and the mean square calculator from the first search period to the second search period, in response to the search period control signal output from the null symbol location detector.

4. The apparatus of claim 3, wherein the size of each window buffer is equal to the data symbol length for MODE 3 of the digital audio broadcasting scheme.

5. The apparatus of claim 3, wherein the first search period is equal to the frame length for MODE 1 of the digital audio broadcasting scheme.

6. The apparatus of claim 3, wherein the second search period is longer than the null symbol length for MODE 1 of the digital audio broadcasting scheme.

7. A method for detecting a transmission mode in a digital audio receiver, comprising the steps of:

(a) calculating the null symbol length of each sample by detecting the starting and end points of the null symbol of each sample; and

- 5 (b) determining a transmission mode by comparing the null symbol length calculated in step (a) with a predetermined range of the null symbol length for each mode.

8. The method of claim 7, further comprising the step of:

calculating the square of the value of each sample of a received signal to detect the starting and end points of the null symbol of each sample.

9. The method of claim 8, wherein step (a) comprises the sub-steps of:

- (a1) calculating the mean square values for a first search period by dividing the sum of the square of each sample stored in a first window buffer by the sum of the square of each sample stored in a second window buffer, and  
5 determining a point with the minimum mean square value to be the starting point of a null symbol, wherein the samples stored in the first window buffer follow the samples stored in the second window buffer, outputting a search period control signal for changing from the first search period to a second  
10 search period;

(a2) in response to the search period control signal, calculating the mean square values for the second search period by dividing the sum of the square of each sample stored in the first window buffer by the sum of the

square of each sample stored in the second window buffer, and determining a  
15 point with the maximum mean square value to be the end point of the null  
symbol, wherein the samples stored in the first window buffer follow the  
samples stored in the second window buffer; and

(a3) calculating the null symbol length using the starting and end  
points of the null symbol detected in steps (a1) and (a2).

10. The method of claim 9, wherein the first search period is equal  
to the frame length for MODE 1 of the digital audio broadcasting scheme, and  
the second search period is longer than the null symbol length for MODE 1.

11. The method of claim 9, wherein step (b) comprises the sub-  
steps of:

(b1) comparing the null symbol length calculated in step (a) with a first  
boundary value for mode determination;

5 (b2) determining the current mode to be a first mode and terminating  
the mode determination if the condition of step (b1) is satisfied;

(b3) comparing the calculated null symbol length with a second  
boundary value for mode determination if the condition of step (b1) is not  
satisfied;

10 (b4) determining the current mode to be a second mode and  
terminating the mode determination if the condition of step (b3) is satisfied;

(b5) comparing the calculated null symbol length with a third boundary value for mode determination if the condition of step (b3) is not satisfied;

(b6) determining the current mode to be a third mode and terminating  
15 the mode determination if the condition of step (b5) is satisfied; and

(b7) determining the current mode to be a fourth mode and terminating the mode determination if the condition of step (b5) is not satisfied.

12. The method of claim 11, wherein the first, second and third boundary values are set according to the null symbol length for each mode.

13. The method of claim 12, wherein the first, second and third boundary values are set so that the boundary values are in the order of increasing null symbol length for each mode.

14. The method of claim 12, wherein the first boundary value is set to a value between the null symbol lengths for MODE 3 and MODE 2 of the digital audio broadcasting scheme, the second boundary value is set to a value between the null symbol lengths for MODE 2 and MODE 4, and the third  
5 boundary value is set to a value between the null symbol lengths for MODE 4 and MODE 1.

15. An apparatus for detecting a transmission mode in an OFDM receiver, comprising:

a null symbol length calculation unit for calculating the null symbol length of each sample by detecting the starting and end points of the null symbol of each sample; and

a mode determination unit for determining a transmission mode by comparing the null symbol length calculated by the null symbol length calculation unit with a predetermined range of the null symbol length for each mode.

16. The apparatus of claim 15, further comprising:

a square value calculation unit for calculating the square of the value of each sample of a received signal to detect the starting and end points of the null symbol of each sample.

17. A method for detecting a transmission mode in an OFDM receiver, comprising the steps of:

(a) calculating the null symbol length of each sample by detecting the starting and end points of the null symbol of each sample; and

(b) determining a transmission mode by comparing the null symbol length calculated in step (a) with a predetermined range of the null symbol length for each mode.

18. The method of claim 17, further comprising the step of:

calculating the square of the value of each sample of a received signal to detect the starting and end points of the null symbol of each sample.